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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re:Appn.of Irving Ames	:	Art Unit Not Yet Assigned
Filed Herewith	:	Examiner Not Yet Assigned
Inventor Irving Ames .	:	Atty.Dkt. YO999-023

For: IMPROVEMENT IN POSITIONING CONTROL OF A COMPUTER MOUSE

PATENT APPLICATION TRANSMITTAL

Commissioner of Patents and Trademarks
Washington, D.C. 20231
Sir:

Transmitted herewith for filing is a Patent Application of Irving Ames for
IMPROVEMENT IN POSITIONING CONTROL OF A COMPUTER MOUSE

Enclosed are:

Patent Application including:
- Transmittal letter - 1 page
- Specification - 17 pages
- Informal Drawings- 2 sheets
- Declaration and Power of Attorney - 2 pages
- Recordation Cover Sheet - 1 page
- Assignment - 1 page
- Associate Power of Attorney -1 page
- Information Disclosure Transmittal with references
- Filing Fee and Assignment Recordation Fee Checks

The filing fee has been calculated as shown below:

Basic Fee		$ 760.00
Total Claims 17 - 20 = 0 extra		$ 00.00
Independent claims 3 - 3 = 0 extra =		$ 00.00
	Total	$ 760.00

Separate checks for $760.00 for the filing fee and $40.00 for the assignment recordation fee are enclosed.

Alvin J. Riddles 6/10/99
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IMPROVEMENT IN POSITIONING CONTROL OF A COMPUTER MOUSE

Field of the invention

The invention is directed to manual guidance by the user in control of a computer through a display interface, and in particular to the positioning of a cursor in the display by the movement of a computer mouse and further in particular to the addition of a frictional force component in the mouse movement that improves positioning control and efficiency.

Background of the invention and relation to the prior art.

As progress evolves in the control of a cursor through a display interface of a computer a number of considerations are operating to make accuracy in positioning and in turn user efficiency, increasingly difficult to achieve. In the art, a positioning device called a mouse has evolved that fits in the hand of the user and which has a rotatable element on the under side that rotates against the surface on which the mouse rests when the mouse is moved. The mouse internally has circuitry that provides and transmits signals correlated with the rotatable element movement that results in movement of the cursor or pointer on the display screen..

Switching elements that deliver operating system signals through the mouse-display

interface can impose psychomotor limitations for a user. The switches are positioned to be under an adjacent finger when the mouse is in the hand of the user but the actuation force for each switch by the respective finger has force components in more than one direction that can introduce a movement force on the mouse that may disrupt the position of the mouse and in turn the cursor. Other users may have other types of hand coordination problems, making it difficult for them to reach and retain targeted locations with a mouse, Complexity is further added by operating system requirements for such actuation features as "double clicks". Complexity is still further added by the fact that some users as their experience and skills change could benefit by having some adjustability in the movement response of the mouse.

Operating system controls that are installed to introduce system biases favoring a particular user such as are discussed in U.S. Patent 5,642,131 also recognize that accurate cursor positioning directly to a particular desired location is inefficient because when the user is able to position the cursor close to the desired location overshoot and undershoot make precise positioning of the cursor difficult. Maneuvering the cursor directly to the desired location must be done with care, requiring slower action, which in turn affects productivity and efficiency.

Summary of the Invention

In the invention, positioning control of a computer mouse is improved by adding a finely adjustable frictional force component to relative motion in the plane of the mouse-supporting surface, or mouse pad, system. The added frictional force component operates to produce a drag component that dampens any forces that would tend to upset the selected mouse position. The frictional force component may be provided, for example by additional small localized weight increments, the effect of a magnetic field or a change in coefficient of friction between parts that move in relation to each other.

Brief Description of the Drawings

Figures 1 and 2 are perspective and side views respectively of a typical prior art computer mouse.

Figures 3 and 4 are each a schematic side view of different embodiments of the invention illustrating the addition of positioned mouse housing weight increments.

Figures 5 and 6 are each a schematic side view of different embodiments of the invention illustrating the use of a magnetic member on the mouse housing providing attraction to a mouse pad type supporting surface containing a ferromagnetic sheet member.

Figure 7 is a schematic side view of an embodiment of the invention illustrating the

addition of increased friction surfaces to the sliding support faces which in turn increase the static and kinetic coefficients of friction between a mouse and a mouse pad.

Description of the invention

In the invention, there is added an adjustable frictional force component in the mouse - mouse pad type supporting surface that improves the positioning control of the mouse by introducing an adjustable drag-type component to the mouse movement in the plane of the mouse - mouse pad interface.

The structural features of a typical mouse are illustrated in connection with Figures 1 and 2 which are perspective and side views respectively and which are labelled prior art. Referring to Fig. 1 and Fig. 2. together; the mouse 100 has a housing that generally fits the hand of the user with the upper curved surface 101 fitting into the heel of the right hand or the left hand of a left handed user. Switches 102 and 103 are provided for the standard clicking functions of the computer and are positioned for actuation by the index and middle fingers of the user . Protrusions 104 and 105, which are usually of plastic, provide frictional sliding surfaces for the mouse. A curved member with a peripheral surface such as a sphere 106 is rotated by tangential contact of the peripheral surface of the sphere in movement of the mouse over the supporting surface. Position sensing mechanisms and circuitry indicated generally as element 110 within the housing of the mouse 100 convert

the motion of the sphere 106 into signals for the computer, resulting in motion of the pointer, or cursor, on a display screen, not shown. The position signals are delivered to the computer through the cable 107 or transmitted by a standard in the art, transmitter, not shown, within the housing of the mouse 100. The mouse 100 has movement in the plane of a supporting surface 108, which is typically a mouse pad 108, which serves as a resilient and uniform friction supplying, supporting surface. For simplicity of description, the supporting surface 108 will be referred to as the mouse pad.

The frictional forces between the lower surfaces of the protrusions 104 and 105 and the upper surface of the mouse pad 108 can be increased by increasing the weight of the mouse. At the present state of the art, the weight of a mouse can be about 100 grams or about 3 ½ ounces. But at that weight, while light enough to avoid hand fatigue, difficulty in positioning can be encountered.

In accordance with the invention, a fine adjustment in frictional force between the mouse and the supporting surface on which it rests can make a difference between improving positioning accuracy while avoiding hand fatigue. The adjustment in frictional force can be provided in many ways including as examples: by the addition of incremental weights and the removal of some if necessary until an optimum overall weight is achieved; by the introduction of a magnetic field perpendicular to the supporting surface, between the mouse and a supporting surface; or by a change in the coefficient of friction in the

mouse-supporting surface interface such as at the mouse support protrusions; or by any combination thereof.

Referring to Figures 3 and 4 which are each a schematic side view of different embodiments of the invention illustrating the addition of a selectively positioned mouse housing weight increment of the order of about 20 to 50 grams, which is less than about half the total weight of a typical mouse and which operates to adjust the frictional force in movement between the mouse 100 and the pad or supporting surface 108.

In the embodiment of Fig. 3, where like reference numerals are used as in previous figures, the frictional force between the mouse 100 and the mouse pad 108 is adjustably increased by placing a locallized group of small metal pellets 111 having a total weight of about 20 to 50 grams into the mouse housing. The weight of the group of pellets 111 is partially balanced by that of the position sensing circuitry 110 which is usually present in the vicinity of the protrusion 104. The pellets 111 typically may have a diameter of about 1/8 inch, similar to buck shot. They are usually placed into the housing after first having been placed into a small plastic wrapper to prevent their scattering to the mechanical and electrical components when inside the housing.

In the embodiment of Fig.4, where like reference numerals are used as in previous figures, the frictional force for movement between the mouse 100 and the mouse pad 108 is

adjustably increased by placing an affixed weight member 112 having a total weight of about 20 to 50 grams over the 101 portion of the housing.100. The weight member 112 may consist for example of one or a plurality of about 1 inch diameter metal discs that are cloth or plastic covered.

Figures 5 and 6 are each a schematic side view of different embodiments of the invention illustrating the use of a magnetic member on the mouse housing providing attraction to an underlying ferromagnetic sheet within the mouse pad.

Referring to Fig. 5 , where like reference numerals are used as in previous figures, use is made of a localized magnetic field to add frictional force to the motion of the mouse with respect to the mouse pad.. Figure 5 depicts the side view of the mouse 100 that with a permanent magnet element 113 affixed to the portion of the mouse 100 adjacent to the mouse pad 108 in the vicinity of protrusion 104. The permanent magnet may be a small portion of magnetic sheet material of the type that adheres to steel surfaces by magnetic attraction. The mouse pad 108 contains a sheet of steel or some other ferromagnetic material 114 with a cover such as a cloth. The magnetic attraction between the permanent magnet 113 and the ferromagnetic sheet 114 in the mouse pad 108 increases the downward force, thereby increasing the frictional force in the relative movement between the mouse 100 and the mouse pad 108, resulting in increased

mechanical resistance to any intermittent and unintended the motion of the mouse. In this embodiment, adjustment ability is achieved by reducing or increasing the area and/or thickness of the affixed magnetic element 113.

In Figure 6 another embodiment is provided of the use of a locallized magnetic field to provide the added frictional force. In the embodiment of Fig.6 , the arrangement is also one that is particularly suitable for use in portable and mobile environments. For optimum use in such environments, the mouse is typically cordless in which the cable 107 in previous figures is by a transmitter located in the circuitry 110. The mouse pad 108 includes a coated or cloth-covered rigid sheet of steel or another ferromagnetic material 114. The magnetic field is provided by means of a relatively strong permanent magnet 115 such as, for example, a ½ inch diameter disc of SmCo that is screw mounted for adjustment to vary the spacing between the magnet 115, through the mouse pad 108 cover to the ferromagnetic material 114. The less the spacing, the greater will be the magnetic attraction. Where the magnetic attraction is increased sufficiently to support the mouse without detachment from its rigid mouse pad over a range of spatial orientations and/or accelerations, the result may be too much frictional force being added to enable comfortable use of the mouse. Such a problem is overcome by providing rollers in place of the usual protrusions. Two such rollers 116 and 117 are indicated in Figure 6.

The combination of weight or magnetic attraction is illustrated symbolically in Figures 3-6

as an arrow.

Another general way to introduce a frictional force requirement into the interface between between the mouse 100 and the mouse pad 108 is to change the coefficient of friction between mating surfaces. Such an approach is illustrated in connection with Figure 7 which is a schematic side view of an embodiment of the invention illustrating the addition of increased friction surfaces to the sliding support faces; this operates to increase the static and kinetic coefficients of friction between the support faces of the mouse 100 and the mouse pad 108.

Referring to Fig. 7, the increase in coefficients of friction is achieved by affixing elements 118 and 119 of a different friction material such as paper-backed adhesive tape to the portions of the relatively smooth protrusions 104 and 105, thereby increasing the static and kinetic coefficients of friction between the mouse 100 and the mouse pad 108.

It will be apparent to one skilled in the art that there will be a wide range of variations within the principles set forth and in addition to the examples listed such mechanisms as the use of hydraulics, pneumatics and viscous fluids may be employed.

Similarly, the principles involving mouse - mouse pad interfaces apply as well to the interfaces of trackballs and other cursor positioning devices.

What has been described is a control principle for a computer mouse that involves adjustably altering a frictional component of the mouse - supporting surface interface.

What is claimed is:

1. In a manually guided pointing operation in a display interface between a user and a computer,

the improvement for position control comprising in combination:

a structural intersection between a curved member on a manually moveable pointing member and a stationary surface,

said curved member having a peripheral surface in tangential contact with said stationary surface,

said curved member further having associated signal generating circuitry operable to move a cursor in said display in response to relative motion of said curved member with respect to said stationary surface at said intersection, and,

a frictional force component in the plane of said tangential contact in said intersection.

2. In a manually guided pointing operation in a display interface between a user and a computer,

the improvement for position control comprising in combination:

a first type structural intersection between a curved member on a manually moveable pointing member and a stationary surface,

said curved member having a peripheral surface in tangential contact with said

stationary surface,

said curved member further having associated signal generating circuitry operable to move a cursor in said display in response to relative motion of said curved member with respect to said stationary surface at said intersection,

at least one second type structural intersection between a protrusion on said manually moveable pointing member and a contact location on said stationary surface,

each said protrusion having a peripheral surface in contact with said stationary surface, and,

a frictional force component at said contact location.

3. The improvement of claim 2 where said protrusion is a member attached to said manually moveable pointing member and taken from a group of a bump and roller.

4. The improvement of Claim 1 wherein said manually movable pointing member and said stationary surface are a computer mouse and mouse pad combination.

5. The improvement of claim 4 wherein said addition of a frictional force component is the result of the addition of a 20 - 50 % increase of the weight of said computer mouse.

6. The improvement of Claim 5 wherein said 20 - 50% weight increase is in the range of 20 - 50 grams.

7. The improvement of Claim 6 wherein said 20 -50% weight increase is in the form of a locallized group of metal particles positioned within a housing of said mouse.

8. The improvement of Claim 6 wherein said 20 - 50% weight increase is in the form of a weight member affixed to a housing of said mouse.

9. The improvement of claim 4 wherein said addition of a frictional force component is the result of the addition of a combination of a magnetic member positioned on the surface of said computer mouse that is adjacent to said computer mouse pad and a ferromagnetic sheet positioned in said mouse pad.

10. The improvement of claim 4 wherein said addition of a frictional force component is the result of the addition of an increase in coefficient of friction of protrusions on the surface of said computer mouse that are adjacent to said computer mouse pad at the surface of said computer mouse pad.

11. The improvement of claim 4 wherein said addition of a frictional force component is a result of at least one addition taken from the group of the addition of

an about 20 - 50% increase to the weight of said computer mouse, the addition of a combination of a magnetic member positioned on the surface of said computer mouse that is adjacent to said computer mouse pad and a ferromagnetic sheet positioned in said mouse pad, and an addition of an increase in coefficient of friction between protrusions on the surface of said computer mouse that is adjacent to said computer mouse pad at the surface of said computer mouse pad.

12. In a computer control interface involving a display and a manually guided mouse on a mouse pad,
the improvement for position control comprising in combination:
a sphere member in said mouse rotatably contacting said mouse pad,
said sphere member having associated signal generating circuitry operable to move a cursor in said display in response to mouse movement measured by rotation of said sphere member with respect to said mouse pad, and,
a frictional force component addition in the plane of said mouse pad opposing said mouse movement.

13. The improvement of claim 12 wherein said frictional force component addition is a result of at least one taken from the group of incremental weights

totaling about 20 - 50 % of the weight of said mouse, the addition of a combination of a magnetic member positioned on the surface of said mouse that is adjacent to said mouse pad and a ferromagnetic sheet positioned in said mouse pad and an addition of an increase in coefficient of friction between protrusions on the surface of said mouse that are adjacent to said mouse pad.

14. The improvement of claim 12 wherein said frictional force component is the result of the addition of an about 20 - 50 % in weight increase of said mouse and said weight increase is produced by about 20 - 50 grams of metal particles in the housing of said mouse..

15. The improvement of claim 12 wherein said frictional force component is the result of the addition of about 20 - 50 % in the weight of said mouse, and said weight increase is produced by affixing to the top of the housing of said mouse an element comprising one or more cloth or plastic covered metal discs totaling about 20 - 50 grams in weight.

16. The improvement of claim 12 wherein said frictional force component is the result of the addition of a combination of a magnetic member positioned on the surface of said mouse that is adjacent to said mouse pad and a ferromagnetic sheet positioned in said mouse pad.

17. The improvement of claim 16 wherein said magnetic member is adjustably positioned and said mouse is positioned on rollers away from said mouse pad.

IMPROVEMENT IN POSITIONING CONTROL OF A COMPUTER MOUSE

ABSTRACT

Control in the positioning of a computer mouse is improved by adding a finely adjusted frictional force component to relative motion in the plane of the mouse - supporting surface, or mouse pad, system. The added frictional force component operates to produce a drag component that dampens the movement. The added frictional force component may be provided by additional small locallized weight increments, the effect of a magnetic field, or a change in coefficient of friction between parts that move in relation to each other, as examples.

FIG 1
PRIOR ART

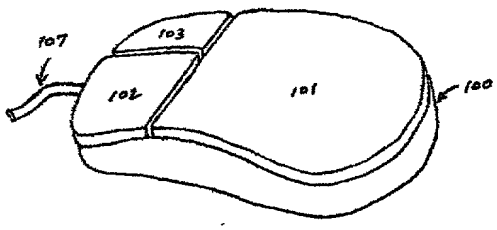


FIG 2
PRIOR ART

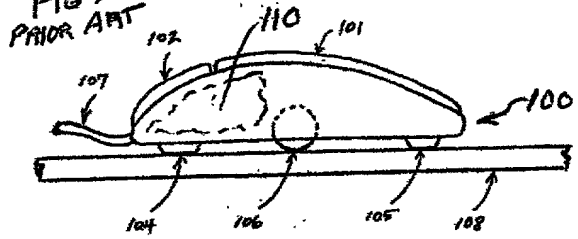


FIG. 3

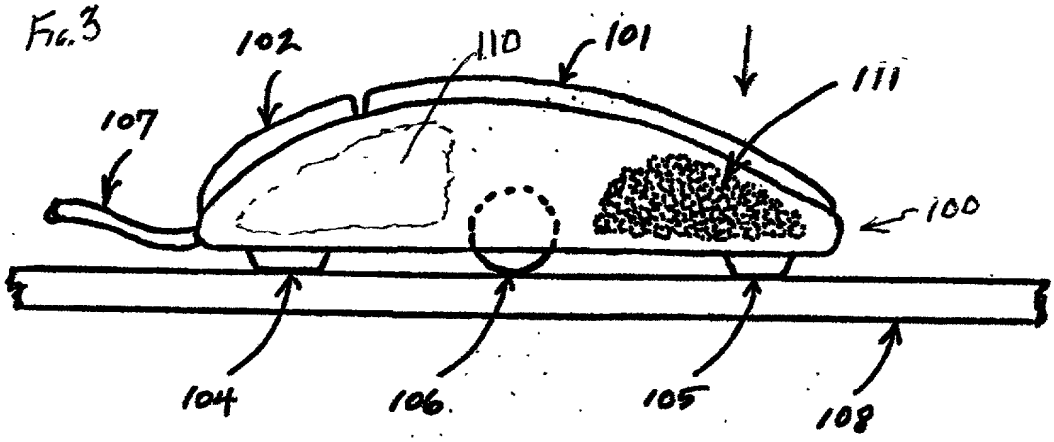


FIG. 4

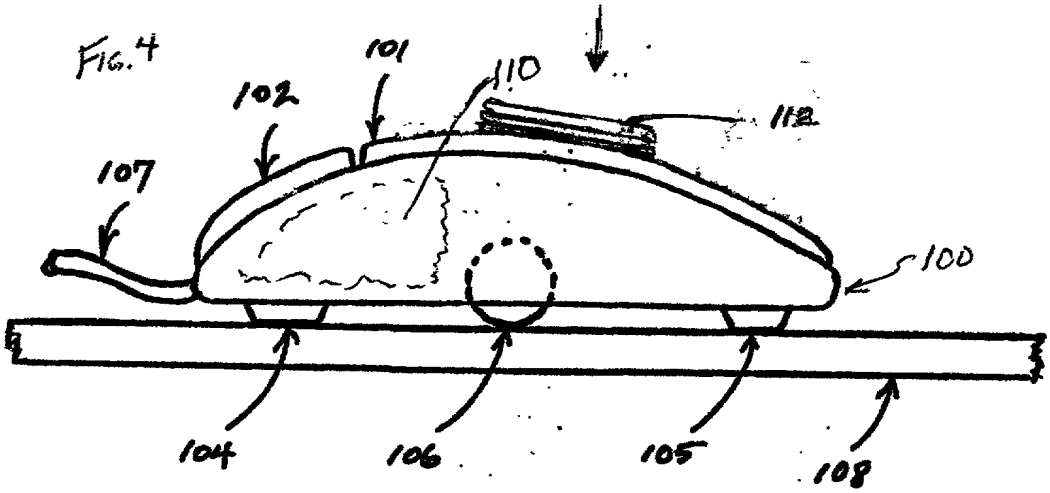


FIG. 5

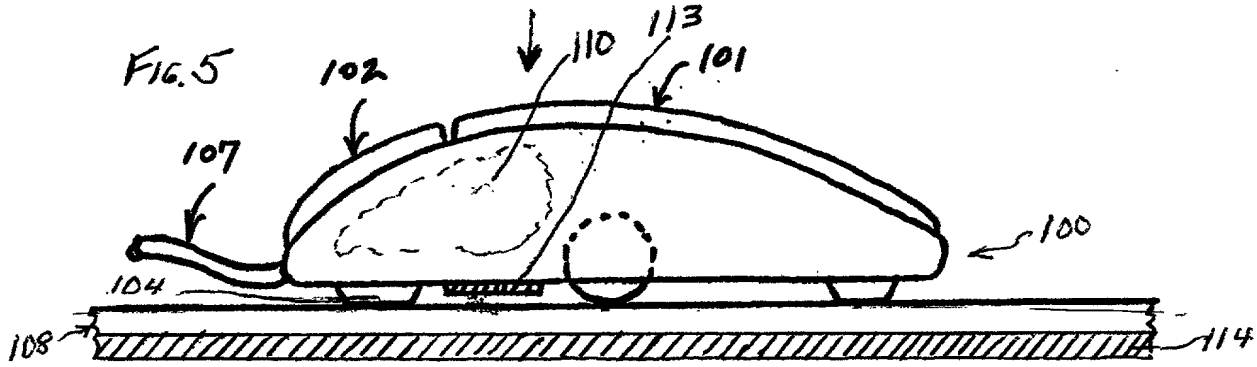


FIG 6

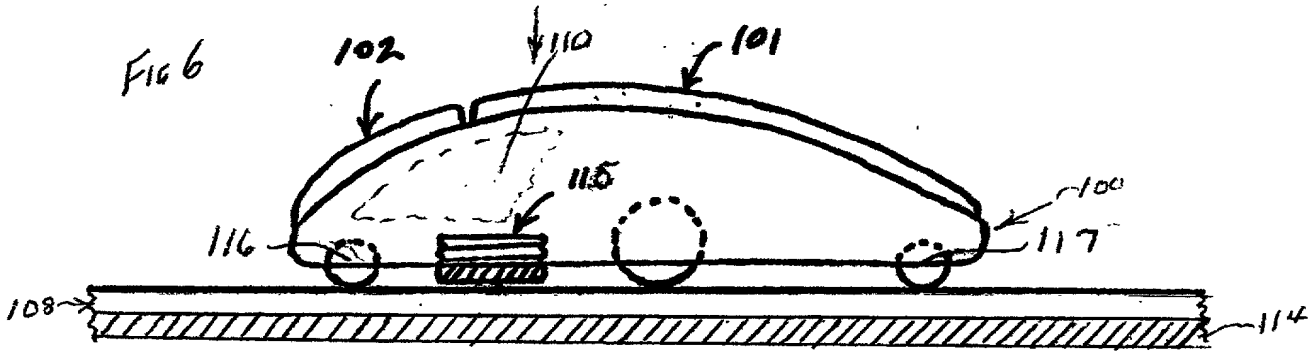
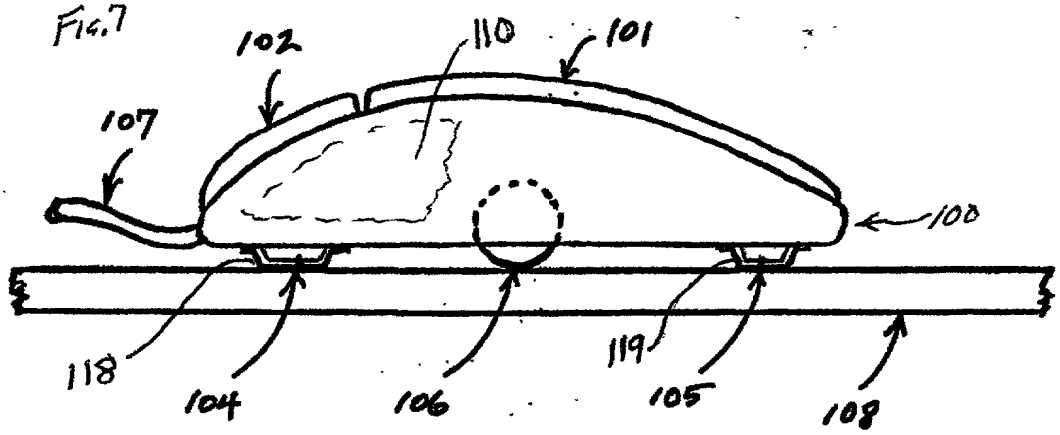


FIG. 7



DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As the below named inventor of this patent application titled,

IMPROVEMENT IN POSITIONING CONTROL OF A COMPUTER MOUSE

IBM Docket YO999-023

I hereby declare :

That my residence, county, post office address and citizenship are as stated below next to my name;

That I am the original first inventor of the subject matter which is claimed in the above identified patent application;

That I acknowledge the duty to disclose information which is material to the patentability of the above identified patent application in accordance with Title 37 Code of Federal Regulations, Section 1.56;

That I hereby state that I have reviewed and understand the contents of the above identified patent application, including the claims;

That all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true ; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.

That as a named inventor I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

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Full Name of inventor

Inventor's Signature and Date Irving Ames June 4, 1999

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USA
Inventor's Citizenship

Same as above
Inventor's Post Office Address

END OF DECLARATION

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In Re: Appn.Ser.No-Not Yet Ass'd	:	Group No-Not Yet Ass'd
Filed Herewith	:	Exr. Not Yet Ass'd
Inventor Irving Ames .	:	Atty.Dkt.YO999-023

APPOINTMENT OF ASSOCIATE ATTORNEY

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

The undersigned attorney , who has been appointed as an attorney in the Declaration and Power of Attorney for the above identified application, hereby appoints Alvin J. Riddles , (Registration No. 17862), Box 34, Candlewood Isle, New Fairfield, Ct. 06812, Telephone number (203) 746-3470 and (914) 472-0644, his associate attorney to file and prosecute said application and to transact all business in the Patent and Trademark Office connected therewith.

Please direct all official communications to Alvin J. Riddles at the address above.

Respectfully submitted,

By 

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